

DWARF SPERM WHALE (*Kogia sima*): Hawaii Stock

STOCK DEFINITION AND GEOGRAPHIC RANGE

Dwarf sperm whales are found throughout the world in tropical to warm-temperate waters (Nagorsen 1985). Dwarf sperm whales are seen infrequently during nearshore surveys. Although they have been seen throughout the main Hawaiian Islands, they appear to be more common near Kauai, Niihau, and Oahu than around the other islands (Baird 2016). Summer/fall shipboard surveys of the waters within the U.S. Exclusive Economic Zone (EEZ) of the Hawaiian Islands resulted in five sightings of dwarf sperm whales during 2002 and one during 2010 (Figure 1; Barlow 2006, Bradford *et al.* 2013). There were no sightings of confirmed dwarf sperm whales during a 2017 survey, though five sightings of *Kogia* sp., not identified to species, were recorded (Yano *et al.* 2018).

Small boat surveys within the main Hawaiian Islands (MHI) since 2002 have documented dwarf sperm whales on 73 occasions, most commonly in water depths between 500m and 1,000m (Baird *et al.* 2013). Long-term site-fidelity is evident off Hawaii Island, with one third of the distinctive individuals seen there encountered in more than one year. Resighting data from 25 individuals documented at Hawaii Island suggest an island-resident population with restricted range, with all encounters in less than 1,600m water depth and less than 20 km from shore (Baird *et al.* 2013). Division of this population into a separate island-associated stock may be warranted in the future. For the Marine Mammal Protection Act (MMPA) stock assessment reports, dwarf sperm whales within the Pacific U.S. EEZ are divided into two discrete, non-contiguous areas: 1) Hawaiian waters (this report), and 2) waters off California, Oregon and Washington. The Hawaii stock includes animals found within the Hawaiian Islands EEZ and in adjacent high seas waters; however, because data on abundance, distribution, and human-caused impacts are largely lacking for high seas waters, the status of this stock is evaluated based on data from U.S. EEZ waters of the Hawaiian Islands (NMFS 2005).

POPULATION SIZE

Encounter data from shipboard line-transect surveys of the entire Hawaiian Islands EEZ was recently reevaluated for each survey year, resulting in updated abundance estimates of dwarf sperm whales in the Hawaii EEZ (Bradford *et al.* 2021; Table 1).

Table 1. Line-transect abundance estimates for dwarf sperm whales or unidentified *Kogia* derived from surveys of the entire Hawaii EEZ in 2017 (Bradford *et al.* 2021).

Year	Species	Abundance	CV	95% Confidence Limits
2017	Unidentified <i>Kogia</i>	53,421	0.63	17,083-167,056
2010		NA		
2002	Dwarf sperm whale	37,440	0.78	9,758-143,648

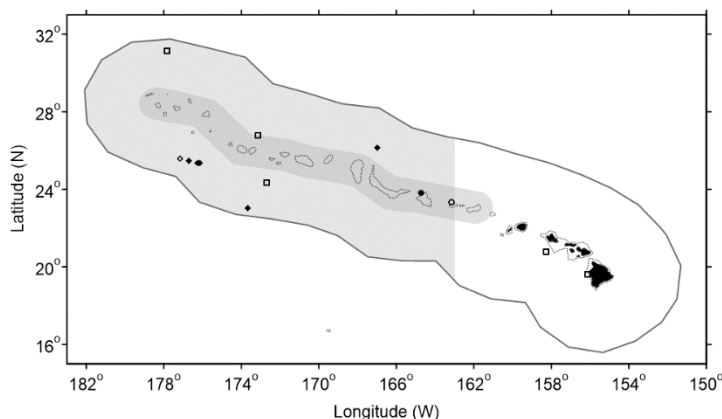


Figure 1. Dwarf sperm whale sighting locations during the 2002 (diamonds) and 2010 (circle) shipboard surveys, as well as sightings of unidentified *Kogia* during 2002 (open diamond), 2010 (open circle), and 2017 (open square) shipboard cetacean surveys of U.S. waters surrounding the Hawaiian Islands (Barlow 2006, Bradford *et al.* 2013). Outer line indicates approximate boundary of survey area and U.S. EEZ. Dark gray shading indicates of the original Papahānaumokuākea Marine National Monument, with the lighter gray shading denoting the full 2016 Expansion area. Dotted line represents the 1000 m isobath.

The updated design-based abundance estimates use sighting data from throughout the central Pacific to estimate the detection function and use Beaufort sea-state-specific trackline detection probabilities for *Kogia* from Barlow *et al.* (2015). Although previous estimates from the Hawaii EEZ have been published using subsets of this data, Bradford *et al.* (2021), uses a consistent approach for estimating all abundance parameters and resulting estimates are considered the best available for each survey year. Wade and Gerrodette (1993) provided an estimate for the eastern tropical Pacific, but it is not known whether these animals are part of the same population that occurs in the central North Pacific. This species' small size, tendency to avoid vessels, and deep-diving habits, combined with the high proportion of *Kogia* sightings that are not identified to species, may result in negatively biased estimates of relative abundance in this region.

Minimum Population Estimate

The log-normal 20th percentile of the 2002 abundance estimate (Bradford *et al.* 2021) is 20,953 dwarf sperm whales within the Hawaiian Islands EEZ; however, the minimum abundance estimate for the entire Hawaiian EEZ is ≥ 8 years old and will no longer be used (NMFS 2005). No minimum estimate of abundance is available for this stock, as there were no sightings of dwarf sperm whales during a 2017 shipboard line-transect survey of the Hawaiian EEZ.

Current Population Trend

No data are available on current population abundance or trend.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

No data are available on current or maximum net productivity rate.

POTENTIAL BIOLOGICAL REMOVAL

The potential biological removal (PBR) level for this stock is calculated as the minimum population size within the U.S. EEZ of the Hawaiian Islands times one half the default maximum net growth rate for cetaceans ($\frac{1}{2}$ of 4%) times a recovery factor of 0.50 (for a stock of unknown status with no known fishery mortality or serious injury within the Hawaiian Islands EEZ; Wade and Angliss 1997). Because there is no minimum population size estimate for Hawaii pelagic dwarf sperm whales, the PBR is undetermined.

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fishery Information

Information on fishery-related mortality of cetaceans in Hawaiian waters is limited, but the gear types used in Hawaiian fisheries are responsible for marine mammal mortality and serious injury in other fisheries throughout U.S. waters. No interactions between nearshore fisheries and dwarf sperm whales have been reported in Hawaiian waters. No estimates of human-caused mortality or serious injury are currently available for nearshore hook and line fisheries because these fisheries are not observed or monitored for protected species bycatch.

There are currently two distinct longline fisheries based in Hawaii: a deep-set longline (DSLL) fishery that targets primarily tunas, and a shallow-set longline fishery (SSLL) that targets swordfish. Both fisheries operate within U.S. waters and on the high seas. Between 2014 and 2018, one unidentified cetacean, identified as probable pygmy or dwarf sperm whale (*Kogia* sp.) was observed hooked in the DSLL fishery (18% observer coverage) (Bradford 2020). Based on an evaluation of the observer's description of the interaction and following the most recently developed criteria for assessing serious injury in marine mammals (NMFS 2012), the injury state could not be determined (Bradford 2020). No dwarf sperm whales were observed hooked or entangled in the SSLL fishery (100% observer coverage).

STATUS OF STOCK

The Hawaii stock of dwarf sperm whales is not considered strategic under the 1994 amendments to the MMPA. The status of dwarf sperm whales in Hawaiian waters relative to OSP is unknown, and there are insufficient data to evaluate trends in abundance. Dwarf sperm whales are not listed as "threatened" or "endangered" under the Endangered Species Act (1973), nor designated as "depleted" under the MMPA. There have been no reported fishery related mortality or injuries within the Hawaiian Islands EEZ, such that the total mortality and serious injury can be considered to be insignificant and approaching zero. The increasing levels of anthropogenic noise in the world's oceans has been suggested to be a habitat concern for whales (Richardson *et al.* 1995), particularly for deep-diving whales like dwarf sperm whales that feed in the oceans' "sound channel".

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